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Promoting Aviation Safety Through Education and Cooperative Efforts

# Course Notes

# Flight Review Prep Guide

## Introduction

### Course Overview

**Welcome to the Flight Review Preparation Course!**

This course offers a structured guide to reviewing the regulations and advisory material you need to know to complete the ground portion of your flight review and, more importantly, to fly safely in the national airspace system. Completing this course in advance of your scheduled flight review will allow you and your instructor to use your ground time more efficiently.

### Course Structure

This course organizes the review of regulations and advisory material into four categories:

**P**ilot - your responsibility as PIC.

**A**ircraft -- airworthiness, maintenance, and inspections.

en**V**ironment - airports, airspace, air traffic control, and weather

**E**xternal pressures -- decision-making and risk management

Each chapter includes links to online material and related media, which are integral to the course. Although some of the course is self-contained, it is primarily intended to be a guide to conducting your own review and study of the material. Links to many online resources (including the online *Aeronautical Information Manual* (AIM)) are provided. Even so, you may want to have paper copies of the regulations (14 CFR 91, 14 CFR 61) and the AIM close at hand as you work though the review. The AIM will be especially helpful in the flight environment chapter of this course.

**Course Table of Contents:**



### Course Completion

You may complete the chapters of the course in any order, and work on it at your convenience. If you wish to print the material, the review section at the end includes a downloadable PDF copy of the course text.

At the end is a 15-question exam to test your understanding of the material. Successful completion of the exam will give you a certificate that you can use for credit in the FAA's Pilot Proficiency (Wings) Program.

The exam for this course is a little different from other tests you may have taken in connection with your pilot training. Although it is a multiple-choice exam, the questions are structured as "mini-scenarios" that test your understanding of how the regulations should be applied in real-world flying. Read them carefully, and select the best (or most complete) answer.

## Pilot

### The Buck Stops Here

The FAA is very clear in stating that being Pilot-in-Command (PIC) of an aircraft -- whatever its size -- is a big responsibility. In fact, the PIC is "directly responsible for, and is the final authority as to, the operation" of the aircraft (14 CFR 91.3). Being PIC means that the buck stops with you. Nobody else - not your passengers, not ATC, and not anyone else on the ground - is the final authority on operation of the aircraft.

### Ignorance is No Excuse

In flying, as on the highway, ignorance of the law is no excuse for making mistakes. In aviation, the rules in 14 CFR 91.103 are very clear about what you *should* know -- everything! If you like acronyms, you might remember that you need a "wealth" of information:

**W**eather reports and forecasts,
**E**xpected performance of the aircraft given expected conditions,
**A**lternatives available,
**L**ength of runways to be used,
**T**raffic delays and terrain avoidance, and
**H**ow much fuel is required.

### Buckle Up

One of your responsibilities as PIC is to ensure that your passengers are briefed on use of safety belts (14 CFR 91.107). This duty has several parts:

- *Notify* each person to fasten safety belts and, if installed, shoulder harnesses.
- *Ensure* that each person has the safety belt properly secured any time the aircraft is in motion.
- *Ensure* that all flight crew members are at their stations.

Flight crew members must have safety belts fastened at all times, and must use shoulder harnesses (if installed) during takeoff and landing unless it would interfere for performance of duties.

It is a good idea to include other items in your preflight briefing to passengers. A good way to remember the topics to cover is to think SAFE:

**S** - seatbelts, shoulder harnesses, sterile cockpit
**A** - air vents and environmental controls
**F** - fire extinguisher location and operation
**E** - exit and emergency instructions (e.g., how to open doors)

## Careful and Wreck-less

One of the broadest rules is 14 CFR 91.13, which says that "no person may operate an aircraft in a careless or reckless manner." The rule applies not only to flight, but also to aircraft operations on the ground. Avoiding careless and reckless operation means complying with all other regulations, including the following:

- You have to ensure that the aircraft is airworthy and in a condition for safe flight (14 CFR 91.7).
- You must take "reasonable precautions" to prevent injury or damage on the ground if you drop something from an airplane (14 CFR 91.15).
- You may not act as PIC if you have consumed alcohol within the last 8 hours, if your blood alcohol content is .04 or higher, or if you are under the influence of any drug that affects your faculties in a way contrary to safety (14 CFR 91.17).
- You may not allow anyone under the influence of alcohol or drugs (except a medical patient under proper care) to be carried in your aircraft, except in an emergency (14 CFR 91.17).

## Fit to Fly?

Flying requires attention and concentration. Many things can affect your fitness to fly, and the familiar **IMSAFE** checklist is a good way to preflight the pilot. As outlined in AIM 8-1-1, you need to verify that you are not impaired by **I**llness, **M**edication, **S**tress, **A**lcohol, **F**atigue, or **E**motion.

You should also be aware of how various situations can affect your perception and your judgment. These include:

- Hypoxia (AIM 8-1-2) and other effects of altitude
- Carbon Monoxide Poisoning (AIM 8-1-4)
- Illusions (AIM 8-1-5)
- Vision (AIM 8-1-6)

You will read more about issues that can affect your judgment in Chapter 4 of this course (External Pressures).

## Aircraft

### Worthy to Fly?

As PIC, you are responsible for determining that the aircraft you intend to fly is airworthy, and in a condition for safe flight (14 CFR 91.7). What does that mean?

You have to have "an appropriate and current airworthiness certificate" in the aircraft (14 CFR 91.203), but the certificate itself does not mean that the aircraft is airworthy. Review the two documents below. According to AC 43.13-1B, (Appendix 1, Glossary), airworthy means that an aircraft (and its component parts) meets its type design, and is in a condition for safe operation.

FAA Handbook 8083-19 (*Plane Sense*) explains these requirements in more detail, but in general:

- ***Conformity*** to type design means that the required and proper components are installed, and that they are consistent with the drawings, specifications, and other data in the type certificate. Conformity includes applicable supplemental type certificates (STCs), and field-approved alterations. It would also include compliance with airworthiness directives (ADs).
- To be in a ***safe condition to fly***, it must have been maintained and inspected as required.

**Related Media for this Section**

**Plane Sense Handbook (FAA-H-8083-19)**
faa-h-8083-19.pdf (15.37 MB)

**Glossary for AC 43.13-1B**
AC 43 13-1B Appendix 1 Glossary.pdf (87.76 KB)

### Properly Equipped?

There are two equipment-related regulations that you need to know especially well.

The first is 14 CFR 91.205, which lists the instruments and equipment required for different types of flight. Some pilots use acronyms to remember these items. Another way is to think of them in terms of three categories: engine, performance/navigation, and safety. Click on the link below for a chart listing required equipment for each of these categories.

The second is 14 CFR 91.213, which deals with inoperative instruments and equipment. The first part of this regulation relates to aircraft for which there is an approved Minimum Equipment List (MEL). If your aircraft does not have a MEL (often the case for light GA aircraft), you need to ask yourself several questions to determine whether you can legally fly with inoperative instruments or equipment. Specifically:

- Is the affected equipment part of the VFR-day type certificate?
- Is the affected equipment listed as required on the aircraft's equipment list or kinds of operation list?
- Is the affected equipment required by any other regulation, e.g., 91.205, 91.207?
- Is the affected equipment required to be operative by an airworthiness directive

If the answer to any of these questions is "yes," then the aircraft must be grounded. If the answer to all of these questions is "no," then the last step is to remove or deactivate the affected item, and mark it as "inoperative." To read the FAA's advisory circular on this topic, click below.

**Related Media for this Section**

**Required Equipment Charts**
Equipment Chart.pdf (25.27 KB)

**AC 91-67 Chapters 1-2**
AC 91-67 Chap1-2.pdf (2.14 MB)

**AC 91-67 Chapter 3**
AC 91-67 Chap3-appendix.pdf (3.1 MB)

## Maintenance Completed?

The owner or operator of an aircraft is primarily responsible for *maintaining* that aircraft in an airworthy condition (14 CFR 91.403). These duties, as outlined in 14 CFR 91.403, 91.407, and 91.417, include ensuring that:

- Required inspections are performed.
- Discrepancies are repaired.
- Maintenance personnel make appropriate logbook entries, to include description of work, date of completion, and signature and certificate number of the person who approves the aircraft for return to service.
- Inoperative instruments and equipment are treated in accordance with 14 CFR 91.213.

As PIC, you do not have to perform these duties yourself. You do, however, have primary responsibility for *verifying* that the aircraft you intend to fly is airworthy and in a condition for safe flight.

## Inspections Done?

Part of ensuring that the aircraft you intend to fly is airworthy and in condition for safe flight involves verifying that all required inspections have been completed. The chart below summarizes what to look for:

| | What | How Often | Reference |
|---|---|---|---|
| A | Annual inspection & ADs | Every 12 calendar months *(ADs are required)* | 14 CFR 91.409 |
| V | VOR check *(if used for IFR)* | Every 30 days | 14 CFR 91.171 |
| 1 | 100 hour inspection *(if used for hire or flight instruction)* | Every 100 hours | 14 CFR 91.409 |
| A | Altimeter & Pitot-Static System | Every 24 calendar months | 14 CFR 91.411 |
| T | Transponder | Every 24 calendar months | 14 CFR 91.413 |
| E | ELT (emergency locator transmitter) operation & battery currency | Every 12 calendar months *(see ref for replacement schedule)* | 14 CFR 91.207 |

## Experimental or Restricted?

If you are flying an aircraft in a restricted or experimental category, you will need to review the regulations concerning operation of these aircraft. You will find the provisions applicable to restricted category aircraft in 14 CFR 91.313. Operating limitations that apply to aircraft with experimental certificates are located in 14 CFR 91.319.

## How Much Fuel?

Fuel-related light aircraft accidents usually involve one of two problems. The first is *fuel starvation*, which means that fuel cannot get to the engine(s), even though there may be plenty of fuel in the tanks. Knowing your aircraft's fuel system very thoroughly is key to avoiding fuel starvation accidents.

The second is *fuel exhaustion*, which results from running out of gas. The regulations attempt to prevent this problem by specifying minimum fuel requirements for different kinds of flight. Regardless of time of day and flight rules (VFR or IFR), the regulations always require you to carry enough fuel to the first point of intended landing, and then continue for a specified period of time. Specifically:

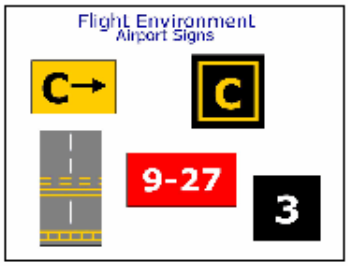
- **Day VFR** - Destination + 30 minutes at cruising speed (91.151)
- **Night VFR** - Destination + 45 minutes at cruising speed (91.151)
- **IFR** - Destination + alternate + 45 minutes at cruising speed (91.167).

*Remember that these numbers are absolute minimum levels*. Many pilots plan to have a least a 1 hour reserve for VFR, and more for IFR flight.

## EnVironment

### All About Airports

The *Aeronautical Information Manual* (AIM) is the primary reference for most of the material covered in this chapter. Links are provided, but you may still want a paper copy available for ready reference.




**Airport markings**: As you see in AIM 2-3, every marking, every sign, every color, and every symbol is designed to give you important information. You will also find it helpful to review AC 150/5340-1J, Standards for Airport Markings, and AC 91-73A, Single Pilot Procedures During Taxi Operations (*see below*). For runway safety diagrams and flashcards, visit the FAA's Runway Safety Program website. The AOPA Air Safety Foundation also offers an interactive online course on runway safety.

**Airport and Traffic Pattern Operations**: AIM 4-3 addresses airport and airport traffic pattern operations in detail, including components, standard altitudes, recommended entries, and direction of turns (also covered in 14 CFR 91.126). Since instructors love to ask about light gun signals, use the chart below to review the information in 14 CFR 91.125 and AIM 4-3-13. One of the current "special emphasis" items related to airport operations is Land-and-Hold-Short Operations, or LAHSO. Your responsibilities for LAHSO are detailed in AIM 4-3-11, and summarized in the LAHSO Q&A below.

**Related Media for this Section**

| | |
|---|---|
| **Standards for Airport Markings** | AC 150-5340 1j.pdf (1.42 MB) |
| **Single Pilot Procedures During Taxi Operations** | AC91-73A.pdf (356.36 KB) |
| **Light Gun Signals** | Light Gun Signals.pdf (11.59 KB) |
| **LAHSO Qs and As** | LAHSO.pdf (11.1 KB) |

### Airspace Refresher

No matter where you fly, you need a thorough knowledge of airspace. The charts below summarize the various types of airspace and the entry, operating, and equipment requirements for each. The FAA offers a separate training course on special use airspace, with special emphasis on the Washington DC Air Defense Identification Zone (ADIZ) and security-related TFRs.

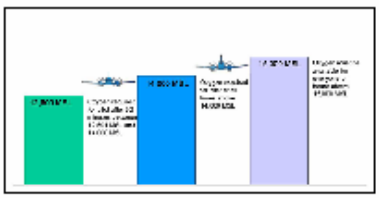
| Type | Who Can Operate | Entry Requirements | Equipment Needed |
|---|---|---|---|
| **A** 91.135 AIM 3-2-2 | IFR pilots with IFR-equipped aircraft | IFR clearance | Two-way radio Altitude-encoding transponder |
| **B** 91.131 AIM 3-2-3 | VFR and IFR | Explicit ATC clearance ("cleared into Class B") | |
| **C** 91.130 AIM 3-2-4 | | Radio communication (ATC use of call sign) | |
| **D** 91.129 AIM 3-2-5 | | | Two-way radio |
| **E** AIM 3-2-6 | VFR and IFR | none | Depends on flight operation (i.e., radio and transponder needed for IFR flight) |
| **G** AIM 3-3 | VFR | none | none |

***Related Media for this Section***

**Airspace Types, Chart Depictions, & Requirements**
Airspace Refresher.pdf (25.19 KB)

## Rules of the Road

Flying, like driving, requires you to follow certain "rules of the road."



**Altitudes**: Click on the graphics below for a summary of rules related to minimum safe altitudes, cruising altitudes, and oxygen requirements. Being at the correct altitude requires that you have the correct altimeter setting. If you are below 18,000 MSL, 14 CFR 91.121 directs you to have the current reported altimeter setting of a station within 100 nm of your route. If not available, you may use the altimeter setting of "an appropriate available station" or that of the departure airport.

**Speed Limits**: Aircraft speed limits are associated with classes of airspace (14 CFR 91.117), as follows:

- 250 knots IAS if below 10,000 MSL
- 200 knots IAS if operating:
  - in airspace underlying Class B, or if
  - within four (4) nm or 2,500 AGL of Class C or D airspace

**Flying Around Other Aircraft**: The basic idea is to keep your distance. The rules (14 CFR 91.111) prohibit operating close enough to another aircraft to create a collision hazard, and you may not fly in formation without prior arrangement with the PIC of the other aircraft. Formation flying is prohibited if you are carrying passengers for hire. One caution: even though the rules permit formation flying in certain circumstances, it is *not* a good idea unless you and the other pilot (s) have specific training and experience in this kind of flying.

Knowing the **right-of-way rules** (14 CFR 91.113) will help you avoid unintentional formation flying.

- An aircraft in ***distress*** always has the right-of-way.
- For ***converging*** aircraft, the aircraft on the right has the right-of-way if the two aircraft are in the same category and class (except that an aircraft towing or refueling another has right-of-way over all other engine-driven aircraft).
  - If the converging aircraft are of different categories, the least maneuverable aircraft has right-of-way (e.g., balloon has right-of-way over any other category).
- To ***overtake*** another aircraft, the overtaking aircraft passes to the right in order to ensure that the PIC of the overtaking aircraft can easily see and avoid the slower aircraft.
- When two aircraft are approaching ***head-on***, each alters course to the right.
- When ***landing***, the aircraft at the lower altitude has right-of-way. However, the rules say that you must not take advantage of this rule to descend and cut in front of another aircraft.

***Related Media for this Section***

**Altitude Rule Summary**
Altitude Charts.pdf (14.57 KB)

**Oxygen Requirements**
O2 requirements chart.pdf (14.63 KB)

## Working with ATC

Air Traffic Control (ATC) provides many services to pilots. These services are extensively described in Chapter 4 of the AIM. Your review should include:

- Approach Control Service for VFR Arriving Aircraft (AIM 4-1-8)
- Traffic Advisory Practices at Airports w/o Operating Control Towers (AIM 4-1-9)
- ATIS (4-1-13
- Radar Assistance to VFR Aircraft (AIM 4-1-16)
- Transponder Operation (AIM 4-1-19))
- Radio Communications Phraseology and Techniques (AIM 4-2).
- Pilot-Controller Glossary

The Pilot-Controller Glossary is an especially important area to review. Did you know, for example, that when ATC instructs you to "fly runway heading," you are expected to fly exactly that heading (i.e., with no drift correction applied)?

For detailed information on ATC Procedures, review AIM Chapter 5. For flight review purposes, your review should include:

- Notice to Airmen (NOTAM) System (AIM 5-1-3)
- VFR Flight Plans (AIM 5-1-4)
- Emergency Procedures (AIM Chapter 6)

## Weather Wisdom

Weather awareness and understanding are vital to safety. There are many sources of weather information, and this section will point to some of the resources available both in print and on the Internet.

Advisory Circular AC-00-45E defines the basic weather conditions as follows:

For special VFR (14 CFR 91.157), the basic requirements are 1 statute mile of visibility and clear of clouds. Special VFR at night requires that the pilot have an instrument rating and that the aircraft be equipped for instrument flight. In all cases, special VFR must be explicitly requested by the pilot.

Click on the VFR Weather Minimums chart for a summary of the additional requirements for flight visibility and distance from clouds (14 CFR 91.155).

For a comprehensive review of aviation weather products and services, take a look at AIM 7-1, Meteorology. This chapter provides extensive information on weather products (AIM 7-1-1), FAA weather services (AIM 7-1-2), preflight briefing (AIM 7-1-4), the en route flight advisory service (AIM 7-1-5), AIRMETS and SIGMETS (AIM 7-1-6), Weather Observing Systems such as AWOS (AIM 7-1-12), and ATC Inflight Weather Avoidance Assistance (AIM 7-1-15).

Pay special attention to AIM information on thunderstorms (AIM 7-1-29) and thunderstorm flying (AIM 7-1-30), which is actually about thunderstorm *avoidance*.

You will also find useful information on decoding TAFs and METARs (AIM 7-1-22 and AIM 7-1-23).

For a practical guide to obtaining, interpreting, and applying weather information to a specific flight, click on the link below for a copy of the GA Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision-Making. You might also want to review the Air Safety Foundation's WeatherWise course on ceiling and visibility.

***Related Media for this Section***

**GA Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision-Making**
GA Weather Decision-Making Dec05.pdf (1.28 MB)

**VFR Cloud Clearance Requirements**
VFR Weather Minimums.pdf (95.77 KB)

**Night Flying Tips & Techniques**
Night Flying Tips.pdf (673.33 KB)

## External Pressures

### Pushing On

At some point in your flying career, you probably got a warning about "get-there-itis." That is because over the years, a number of general aviation accidents have been associated with external or social pressures, such as the pilot's reluctance to appear cowardly or to disappoint passengers eager to make or continue a trip. There is almost always pressure on the pilot to launch, and pressure to continue. Even the small investment in making the trip to the airport can create pressure to avoid wasted time.

**Factors that can affect you include:**

- Someone waiting at the airport;
- Fear of disappointing friends or family;
- Desire to demonstrate pilot qualifications (e.g., instrument rating);
- Desire to impress someone;
- Desire to satisfy an personal goal; and
- Pilot's general goal-completion orientation.

Learning to resist these external pressures is vital to safe flying.

### Pushing Back

**Here are some ways to push back against pressures to push on:**

- Develop personal minimums that will help you make the toughest go / no-go and continue / divert decisions well in advance of any specific flight.
- Let your passengers know that safety is your top priority.
- Manage passenger expectations right from the start:
  - Show them your personal minimums, and tell them up front that you will not launch, or continue, in conditions that do not meet your pre-established minimums.
  - Know what pressures are driving them, and develop alternatives (e.g., airline tickets, hotel rooms, rental cars) before you start the trip that will relieve anxiety for both you and your passengers.
- Advise anyone meeting you that your plans are flexible.
- Establish "reality check" checkpoints along the route, at which you will reevaluate conditions before pressing on.
- If possible have an alternative in mind for every 25-30nm segment of your flight. Know in advance what conditions will trigger a diversion.
- Remind yourself - and others - that one of the most effective tools you have is waiting! Bad weather rarely lasts more than a day or two.

Click below for copy of the PAVE Personal Minimums Checklist and a copy of a personal minimums development worksheet.

**Related Media for this Section**

**PAVE Personal Minimums Checklist**
Personal Minimums Checklist.pdf (154.92 KB)

**Personal Minimums Worksheet**
Personal Minimums Worksheet.pdf (31.04 KB)

## Making Good Decisions

We all talk about good decision-making, but what is it? How do we accomplish it? There are many formal definitions, but good decision-making comes down to getting information, evaluating that information, and doing the right thing.

One of the best ways to think is to constantly ask yourself questions. There are many models for decision-making. One model that you might want to try is the FAA's 3-P framework, in which you:

- **P** erceive hazards
- **P** rocess their impact on your safety, and
- **P** erform by mitigating or eliminating the problem.


**The 3-P model encourages you to ask questions:**

What can hurt me? (perceive)
How can it hurt me? (process)
How can I make sure it doesn't hurt me? (perform)

Click below for a short description of the 3-P approach.

**Related Media for this Section**

**3-P Decision-Making Approach**
3P Risk Management Process.pdf (47.01 KB)

## Review

### Chapter 1 - Pilot

The FAA gives "direct" responsibility and "final authority" for operation of an aircraft to the pilot-in-command. You are thus responsible for obtaining all available information about the flight and about your aircraft. Being PIC means you also have certain responsibilities to your passengers.

### Chapter 2 - Aircraft

For aircraft to be airworthy, it must conform to its type design and be in a condition for safe flight. That means ensuring that all required maintenance and inspections have been performed, and that you have all the required equipment. Taking care of your aircraft also means ensuring that you have enough fuel (including reserves).

### Chapter 3 - Environment for Flight

As PIC, you need to be thoroughly familiar with airport markings (signs, colors, symbols, lights), as well as with airport and traffic pattern operations recommended in the AIM. Flying safely in the National Airspace System requires a solid understanding of airspace, including special use airspace and "rules of the road" for altitudes, speeds, distance from other aircraft, and ATC procedures. Another important part of the flight environment is weather, which includes not only obtaining information, but also knowing how to interpret and apply it.

### Chapter 4 - External Pressures

Pilots are always under pressure to push on, so it is important to know how to push back against external and social pressures. Personal minimums and use of the 3-P aeronautical decision-making model can help you resist the temptation to launch or continue against your better judgment.

### Resources

**Pilot**:

- Human Factors Awareness (FAA online course)
- Hazardous Attitudes Assessment

**Aircraft**:

- ASF Engine & Propeller (online course)

**EnVironment**:

- Aviation Digital Data Service (ADDS)
- FAA Regulatory and Guidance Library
- Graphical TFRs Website
- Mountain Flying (ASF online course)
- Navigating the DC ADIZ and TFRs (online course)
- Runway Safety Resources (FAA)
- Runway Safety (ASF online course)
- Thunderstorm Avoidance (ASF online course)
- Weather Resources (FAA)
- WeatherWise (ASF online course)

**External Pressures**:

- AC on Aeronautical Decision-Making
- Aviator's Model Code of Conduct

**Related Media for this Section**

**Flight Review Prep Course**
Flight Review Prep Course.pdf (1.03 MB)